WHAT IS CLAIMED IS:

1. An isolated and purified polynucleotide comprising a nucleic acid sequence encoding *ligA* from *Leptospira interrogans*.

2. The polynucleotide of claim 1, wherein the polynucleotide comprises SEQ ID NO: 1.

3. An isolated and purified polynucleotide comprising a nucleic acid sequence encoding *ligB* from *Leptospira interrogans*.

4. The polynucleotide of claim 3 wherein the polynucleotide comprises SEQ ID NO: 3 or SEQ ID NO:45.

5. An isolated and purified polypeptide comprising a LigA polypeptide from *Leptospira interrogans*.

6. The polypeptide of claim 5, wherein the polypeptide comprises SEQ ID NO: 2.

7. An isolated and purified polypeptide comprising a LigB polypeptide from *Leptospira interrogans*.

8. The polypeptide of claim 7, wherein the polypeptide comprises SEQ ID NO: 4 or SEQ ID NO:46.

9. A pharmaceutical composition comprising
   (a) a purified polypeptide from *Leptospira*, and
   (b) a pharmaceutically acceptable carrier, wherein the composition is capable of eliciting an immune response against *Leptospira interrogans*.

10. The composition of claim 9, wherein the polypeptide is LigA or LigB.

into dogs either intramuscularly or subcutaneously. Alternatively, the T-cell epitope is inserted into the adenylate cyclase gene of an attenuated *B. bronchiseptica* strain in frame, and the dogs are given the live bacteria.

Recombinant antigens are promising candidates for human and animal vaccination against various pathogens. However, a serious drawback is the poor immunogenicity of recombinant antigens as compared to native antigens. A major challenge in the development of a new recombinant vaccine is, therefore, to have a new adjuvant system that increases the immunogenicity of antigens. Cytokines are powerful immunoregulatory molecules. Cytokines which could be used as adjuvants in this invention include, but are not limited to, IL-12 (interleukin-12), GM-CSF (granulocyte-macrophage colony stimulating factor), IL-1β (interleukin-1β) and γ-IFN (gamma interferon).

These cytokines can have negative side effects including pyrogenic and/or proinflammatory symptoms in the vaccinated host. Therefore, to avoid the side effects of a whole cytokine protein, an alternate approach is to use synthetic peptide fragments with the desired immunostimulatory properties. The nonapeptide sequence VQGEESNDK of IL-1β protein is endowed with powerful immuno-enhancing properties, and is discussed here to illustrate the use of a cytokine to increase immunogenicity.

SEQ ID NO 7

This nonapeptide is inserted into the ProA, ProB, mmpA, the cytochrome oxidase homolog, or the partial lipoprotein signal peptidase homolog protein and its immunogenicity is compared to that of the native protein. Reportedly, the insertion of this sequence into a poorly immunogenic recombinant antigen increases the chance of a strong protective immune response after vaccination. This peptide could enhance the *in vivo* immune response against both T-dependent and T-independent antigens. The canine IL-1β sequence may mimic many immunomodulatory activities of the entire molecule of IL-1β while apparently lacking many of its undesirable proinflammatory properties. This strategy is employed to increase the immunogenicity of ProA, ProB, mmpA, cytochrome oxidase, the partial lipoprotein signal peptidase homolog and other *E. canis* antigens.

Plasmid pYFC199 is derived from a pBR322 plasmid by the insertion of a fragment that includes the ProA, ProB, mmpA, the cytochrome oxidase homolog, or the partial lipoprotein signal peptidase protein from *E. canis*. This plasmid contains a unique